58MTA
Deluxe 4-Way Multipoise Variable-Capacity Direct-Vent Condensing Gas Furnace

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Service and Maintenance Instructions For Sizes 060-120, Series 100

NOTE: Read the entire instruction manual before starting the installation.

This symbol → indicates a change since the last issue.

A93040

REGISTERED QUALITY SYSTEM

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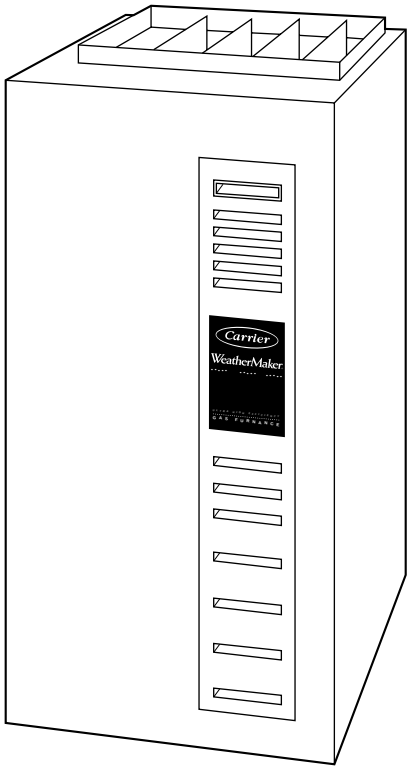

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Fig. 1—Multipoise Furnace in Upflow Orientation

SAFETY CONSIDERATIONS

Installing and servicing heating equipment can be hazardous due to gas and electrical components. **Only trained and qualified personnel should install, repair, or service heating equipment.**

Untrained personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on heating equipment, observe precautions in the literature, on tags, and on labels attached to or shipped with the unit and other safety precautions that may apply.

Follow all safety codes. In the United States, follow all safety codes including the National Fuel Gas Code (NFGC) NFPA 54-1999/ANSI Z223.1-1999 and the Installation Standards, Warm Air Heating and Air Conditioning Systems (NFPA 90B) ANSI/NFPA 90B. In Canada, refer to the CAN/CGA-B/49.1- and

.2-M00 National Standard of Canada, Natural Gas and Propane Installation Codes (NSCNGPIC). Wear safety glasses and work gloves. Have a fire extinguisher available during start-up and adjustment procedures and service calls.

This is the safety-alert symbol ⚠ . When you see this symbol on the furnace and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal words DANGER, WARNING, CAUTION, and NOTE. These words are used with the safety-alert symbol. DANGER identifies the most serious hazards which **will** result in severe personal injury or death. WARNING signifies hazards which **could** result in personal injury or death. CAUTION is used to identify unsafe practices which **would** result in minor personal injury or product and property damage. NOTE is used to highlight suggestions which **will** result in enhanced installation, reliability, or operation.

⚠ WARNING

The ability to properly perform maintenance on this equipment requires certain knowledge, mechanical skills, tools, and equipment. If you do not possess these, do not attempt to perform any maintenance on this equipment other than those procedures recommended in the User's Manual. FAILURE TO FOLLOW THIS WARNING COULD RESULT IN POSSIBLE DAMAGE TO THIS EQUIPMENT, SERIOUS PERSONAL INJURY, OR DEATH.

⚠ WARNING

Never store anything on, near, or in contact with the furnace, such as:

1. Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.
2. Soap powders, bleaches, waxes or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.
3. Paint thinners and other painting compounds, paper bags, or other paper products.

A failure to follow this warning can cause corrosion of the heat exchanger, fire, personal injury, or death.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

INTRODUCTION

These instructions are written as if the furnace is installed in an upflow application. An upflow furnace application is where the blower is located below the combustion and controls section of the furnace, and conditioned air is discharged upward. Since this furnace can be installed in any of the 4 positions shown in Fig. 2, you must revise your orientation to component location accordingly.

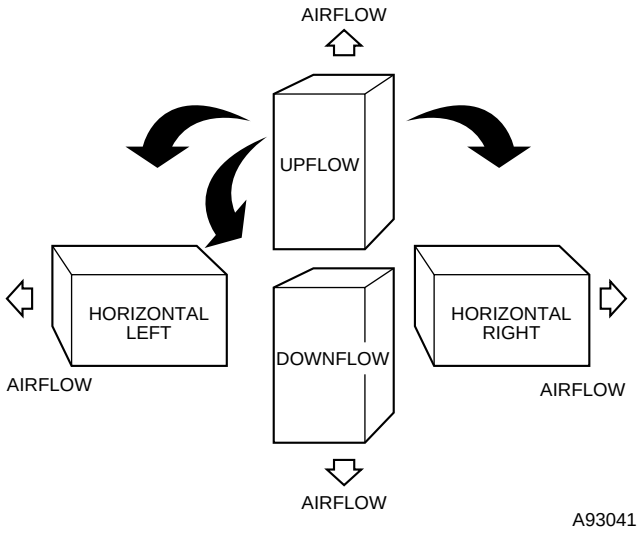

Fig. 2—Multipoise Orientation

ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and servicing to protect the furnace electronic control. Precautions will prevent electrostatic discharges from personnel and hand tools which are held during the procedure. These precautions will help to avoid exposing the control to electrostatic discharge by putting the furnace, the control, and the person at the same electrostatic potential.

1. Disconnect all power to the furnace. DO NOT TOUCH THE CONTROL OR **ANY** WIRE CONNECTED TO THE CONTROL PRIOR TO DISCHARGING YOUR BODY'S ELECTROSTATIC CHARGE TO GROUND.
2. Firmly touch a clean, unpainted, metal surface of the furnace chassis which is close to the control. Tools held in a person's hand during grounding will be satisfactorily discharged.
3. After touching the chassis you may proceed to service the control or connecting wires as long as you do nothing that recharges your body with static electricity (for example; DO NOT move or shuffle your feet, DO NOT touch ungrounded objects, etc.).
4. If you touch ungrounded objects (recharge your body with static electricity), firmly touch furnace again before touching control or wires.
5. Use this procedure for installed and uninstalled (ungrounded) furnaces.
6. Before removing a new control from its container, discharge your body's electrostatic charge to ground to protect the control from damage. If the control is to be installed in a furnace, follow items 1 through 5 before bringing the control or yourself into contact with the furnace. Put all used AND new controls into containers before touching ungrounded objects.
7. An ESD service kit (available from commercial sources) may also be used to prevent ESD damage.

CARE AND MAINTENANCE

For continuing high performance and to minimize possible equipment failure, it is essential that maintenance be performed on this equipment. Consult your local dealer about proper maintenance frequency and the availability of a maintenance contract.

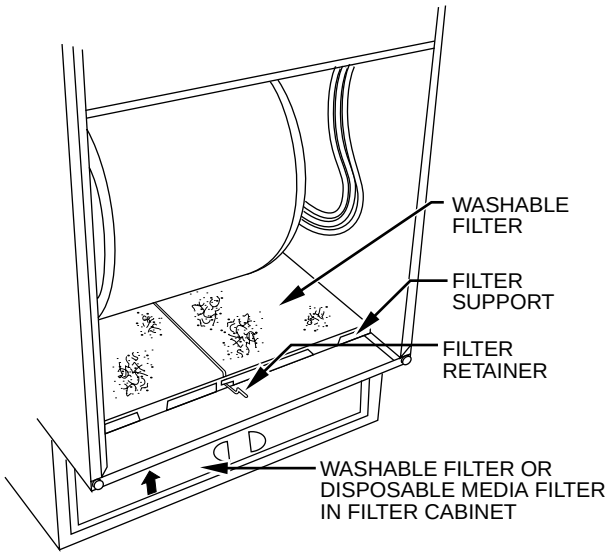

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Fig. 3—Bottom Filter Arrangement

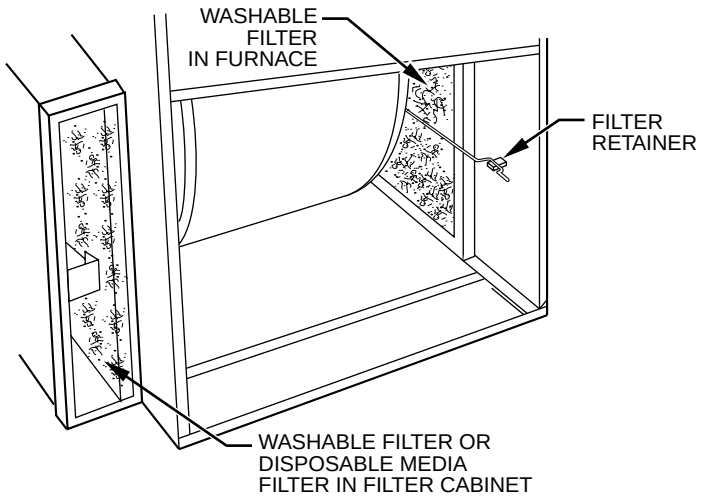

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Fig. 4—Filter Installed for Side Inlet

⚠ WARNING

Turn off the gas and electrical supplies to the unit before performing any maintenance or service. Follow the operating instructions on the label attached to the furnace. Failure to follow this warning could result in personal injury or death.

The minimum maintenance that should be performed on this equipment is as follows:

1. Check and clean or replace air filter each month as required.
2. Check blower motor and wheel for cleanliness each heating or cooling season.
3. Check electrical connections for tightness and controls for proper operation each heating season. Service as necessary.
4. Check for proper condensate drainage. Clean as necessary.
5. Check for blockages in combustion-air and vent pipes annually.
6. Check burners for cleanliness annually.

⚠ CAUTION

Personal injury could result from sharp metal edges, etc. Use care when removing parts.

Step 1—Cleaning and/or Replacing Air Filter

The air filter arrangement may vary depending on the application or orientation.

⚠ WARNING

Never operate unit without a filter or with the blower access door removed. Failure to follow this warning could result in a fire, personal injury, or death.

NOTE: If the filter has an airflow direction arrow, the arrow must point toward the blower.

To clean or replace filters, proceed as follows:

If filter is installed in filter cabinet adjacent to furnace:

1. Turn off electrical supply to furnace.
2. Remove filter cabinet door.
3. Slide filter out of cabinet.
4. If equipped with permanent, washable filter, clean filter by spraying cold tap water through filter in opposite direction of airflow. Rinse filter and let dry. Oiling or coating of the filter is not recommended.
5. If equipped with factory specified disposable media filter, replace only with media filter having the same part number and size.
6. Slide filter into cabinet.
7. Replace filter cabinet door.
8. Turn on electrical supply to furnace.

If filter is installed in furnace blower compartment:

1. Turn off electrical supply to furnace.
2. Remove main furnace door and blower access door.
3. Release filter retainer wire. (See Fig. 3 and 4.)
4. Slide filter out of furnace.
5. Furnaces are equipped with permanent, washable filter(s). Clean filter by spraying cold tap water through filter in opposite direction of airflow.
6. Rinse filter and let dry. Oiling or coating filter is not recommended.
7. Slide filter into furnace.
8. Recapture filter retainer wire.
9. Replace blower access door and main furnace door.
10. Turn on electrical supply to furnace.

Step 2—Blower Motor and Wheel Maintenance

To ensure long life, economy, and high efficiency, clean accumulated dirt and grease from blower wheel and motor annually.

The inducer and blower motors are pre-lubricated and require no additional lubrication. These motors can be identified by the absence of oil ports on each end of the motor.

The following items should be performed by a qualified service technician.

Clean blower motor and wheel as follows:

1. Turn off electrical supply to furnace.
2. Remove main furnace door and blower access door.
3. Disconnect wires.

All factory wires can be left connected, but field thermostat connections may need to be disconnected depending on their length and routing.

4. Remove control box mounting screws and position control box, transformer, and door switch assembly to right side of furnace casing.
5. If condensate trap is located in left- or right-hand side of furnace casing, proceed to item 6, otherwise remove trap and tubing as described below:
   a. Disconnect field drain connection from condensate trap.
   b. Disconnect drain and relief port tubes from condensate trap.
   c. Remove condensate trap from blower shelf.
6. Remove screws securing blower assembly to blower shelf and slide blower assembly out of furnace.
7. Clean blower wheel and motor by using a vacuum with soft brush attachment. Be careful not to disturb balance weights (clips) on blower wheel vanes. Do not bend wheel or blades as balance will be affected.
8. If greasy residue is present on blower wheel, remove wheel from the blower housing and wash it with an appropriate degreaser. To remove wheel:
   a. Mark blower wheel location on shaft before disassembly to ensure proper reassembly.
   b. Loosen setscrew holding blower wheel on motor shaft.

NOTE: Mark blower mounting arms and blower housing so each arm is positioned at the same hole location during reassembly.

   c. Mark blower wheel orientation and cutoff plate location to ensure proper reassembly.
   d. Remove screws securing cutoff plate and remove cutoff plate from housing.
   e. Remove bolts holding motor mounts to blower housing and slide motor and mounts out of housing. Disconnect capacitor and ground wire attached to blower housing before removing motor.
   f. Remove blower wheel from housing.

⚠ CAUTION

The blower wheel should not be dropped or bent as balance will be affected.

   g. Clean wheel per instructions on degreaser cleaner.
9. Reassemble motor and blower wheel by reversing items 8b through 8f. Ensure wheel is positioned for proper rotation.
10. Reinstall blower assembly in furnace.
11. Reinstall control box, transformer, and door switch assembly on blower shelf.
12. Reinstall condensate trap and tubing if previously removed.
   a. Reinstall condensate trap in hole in blower shelf.
   b. Connect condensate trap drain tubes. See Fig. 8 or tubing diagram on main furnace door for proper tube location.
      (1.) Connect 1 tube (blue or blue and white striped) from collector box.
      (2.) Connect 1 tube (violet or unmarked) from inducer housing.
      (3.) Connect 1 tube (relief port, green or pink) from collector box.

NOTE: Ensure tubes are not kinked or pinched, as this will affect operation.

NOTE: Refer to Table 1 for motor speed lead relocation if leads were not identified before disconnection.

Table 1—Speed Selection

COLOR	SPEED	AS SHIPPED
White	Common	COM
Black	High	Cool
Yellow	Med-High	SPARE
Orange†	Med	High-Gas Heat
Blue	Med-Low	Spare/High-Gas Heat
Red	Low*	Low-Gas Heat

* Continuous blower speed.
† Available on 5-speed blowers only.

⚠ CAUTION

Heating air speed selection MUST be adjusted to provide proper temperature rise as specified on the rating plate. Failure to adjust the heating speed may shorten heat exchanger life.

   c. Connect field drain to condensate trap.
13. Reconnect wires.

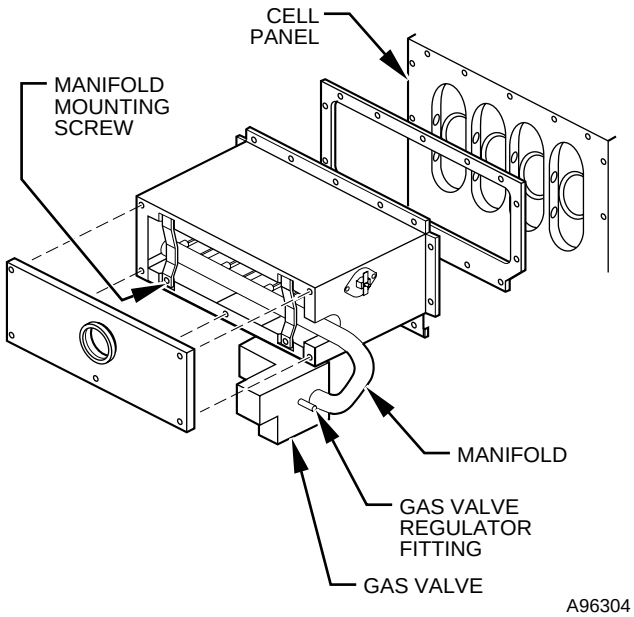

Fig. 5—Burner Box Assembly

Refer to furnace wiring diagram and connect thermostat leads if previously disconnected. (See Fig. 16.)

14. Turn on electrical supply. Manually close blower access door switch. Use a piece of tape to hold switch closed. Check for proper rotation and speed changes between heating and cooling by jumpering R-to-W/W1, R-to-W/W1-and-W2 and then R-to-Y/Y2 on control thermostat terminals. (See Fig. 11.)

⚠ WARNING

Blower access door switch opens 115-v power to control. No component operation can occur. Caution must be taken when manually closing this switch for service purposes. Failure to follow this warning could result in personal injury or death.

15. If furnace is operating properly, release blower access door switch, replace blower access door, and replace main furnace door.

Step 3—Cleaning Burners

The following items should be performed by a qualified service technician. If the burners develop an accumulation of light dirt or dust, they may be cleaned by using the following procedure:

1. Turn off gas and electrical supplies to furnace.
2. Remove main furnace door.
3. Remove burner box cover.
4. Using backup wrench, disconnect gas supply pipe from gas valve.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation.

5. Remove wires from gas valve. Note location for reassembly.
6. Remove burner box pressure tube from gas valve regulator fitting.
7. Remove screws that secure manifold to burner box. (See Fig. 5.)
8. Remove manifold, orifices, and gas valve as 1 assembly.
9. Remove screws attaching burner assembly in burner box.
10. Remove burner assembly from burner box.

NOTE: All burners are attached to burner bracket and can be removed as 1 assembly.

11. Clean burners with soft brush and vacuum.
12. Reinstall manifold, orifice, and gas valve assembly in burner box. Ensure manifold seal grommet is installed properly and burners fit over orifices.
13. Reconnect wires to gas valve. Refer to furnace wiring diagram for proper wire location.
14. Reinstall burner box pressure tube to gas valve regulator fitting.
15. Reinstall gas supply pipe to gas valve using backup wrench on gas valve to prevent rotation and improper orientation.

NOTE: Use propane gas resistant pipe dope to prevent gas leaks. DO NOT use Teflon tape.

⚠ WARNING

Gas valve switch or knob MUST be facing forward or tilted upward. Failure to follow this warning could result in property damage, personal injury, or death.

16. Replace burner box cover.
17. Turn on gas and electrical supplies to furnace.
18. Check for gas leaks.

⚠ WARNING

Never use matches, candles, flame, or other sources of ignition to check for gas leakage. Use a soap-and-water solution. Failure to follow this warning could result in a fire, personal injury, or death.

19. Replace main furnace door.

Step 4—Cleaning Heat Exchangers

The following items should be performed by a qualified service technician.

PRIMARY HEAT EXCHANGERS

If the heat exchangers get an accumulation of light dirt or dust on the inside, they may be cleaned by the following procedure:

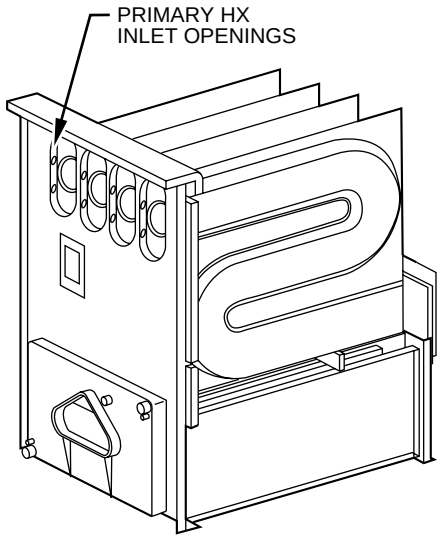

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Fig. 6—Cleaning Inlet Openings of Primary Heat Exchangers

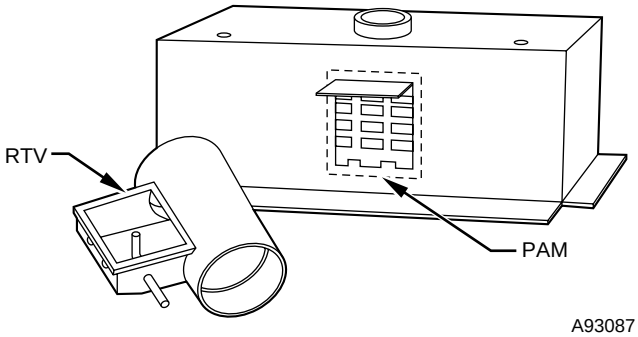

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Fig. 7—Combustion-Air Intake Housing Gasket Repair

NOTE: If the heat exchangers get a heavy accumulation of soot and carbon, both the primary and secondary heat exchangers should be replaced rather than trying to clean them thoroughly due to their intricate design. A build-up of soot and carbon indicates that a problem exists which needs to be corrected, such as improper adjustment of manifold pressure, insufficient or poor quality combustion air, improper vent termination, incorrect size or damaged manifold orifice(s), improper gas, or a restricted heat exchanger (primary or secondary). Action must be taken to correct the problem.

1. Turn off gas and electrical supplies to furnace.
2. Remove main furnace door.

⚠ CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and hazardous operation.

3. Disconnect wires or connectors to rollout switch, gas valve, ignitor, and flame sensor.
4. Disconnect combustion-air intake pipe from intake housing.
5. Remove the pressure switch tube from intake housing.
6. Remove screws attaching intake housing to burner box, and rotate intake housing away from burner box for removal.
7. Using backup wrench, disconnect gas supply pipe from gas valve.

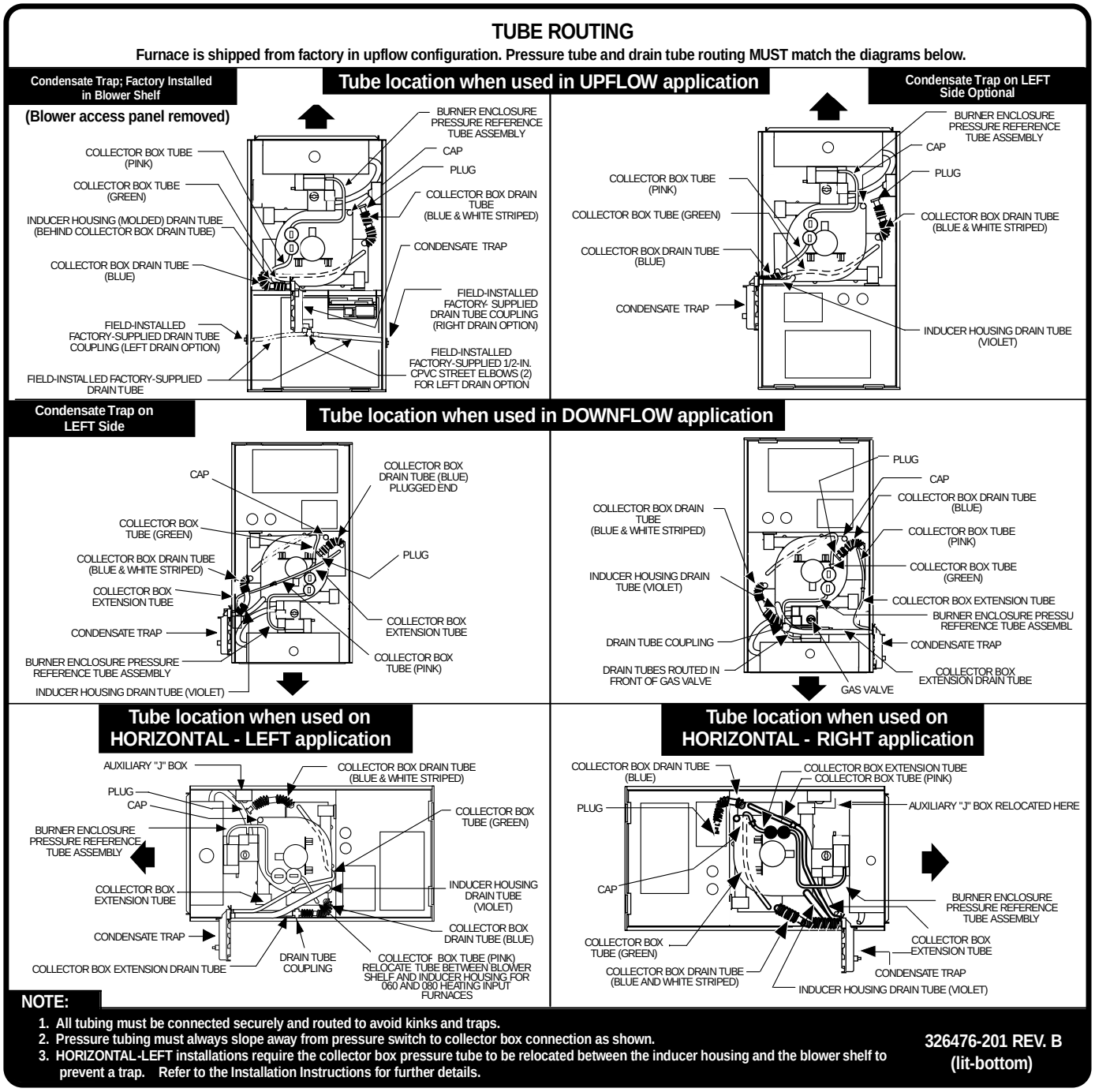

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Fig. 8—Furnace Pressure and Draining Tube Diagram

8. Disconnect pressure tubing from gas valve.
9. Remove 2 screws attaching top filler panel and rotate upwards to gain access to screws attaching burner box to cell panel.
10. Remove screws attaching burner box to cell panel. (See Fig. 5.)

NOTE: Burner box cover, manifold, gas valve, and burner assembly should be removed as 1 assembly.

11. Clean heat exchanger openings with a vacuum and a soft brush. (See Fig. 6.)

NOTE: After cleaning, inspect the heat exchangers to ensure they are free of all foreign objects that may restrict flow of combustion products.

12. Reverse items 4 through 10 for reassembly.

⚠ WARNING

The ground wire from the gas valve MUST be attached to the burner box attachment screw. Failure to attach this ground wire to an adequate casing ground will cause the furnace control to lock out.

NOTE: Be sure burner box gasket is installed between burner box and cell panel. If gasket is damaged, replace it.

NOTE: Inspect combustion-air intake housing. If foamed gasket was removed, check for any damage. If gasket is damaged in any way, it must be repaired. To repair, remove damaged gasket section, apply sealant releasing agent such as PAM cooking spray or equivalent (must not contain corn or canola oil, aromatic or halogenated hydrocarbons or inadequate seal may occur) to burner

box and apply a small bead of G.E. RTV 162, G.E. RTV 6702, or Dow-Corning RTV 738 sealant to edge of combustion-air intake housing. (See Fig. 7.)

13. Refer to furnace wiring diagram and reconnect wires to rollout switch, gas valve, ignitor, and flame sensor.
14. Reconnect pressure switch tubes to gas valve and intake housing. Refer to tube routing label on main furnace door or Fig. 8 for proper tube location. Be sure tubes are not kinked.
15. Turn on gas and electrical supplies to furnace.
16. Check furnace operation through 2 complete heat operating cycles. Look through sight glass in burner enclosure to check burners. Burner flames should be clear blue, almost transparent. (See Fig. 9.)
17. Check for gas leaks.

⚠ WARNING

Never use matches, candles, flame, or other sources of ignition to check for gas leakage. Use a soap-and-water solution. Failure to follow this warning could result in a fire, personal injury, or death.

18. Replace main furnace door.

SECONDARY HEAT EXCHANGERS

NOTE: The condensing side (inside) of the secondary heat exchangers CANNOT be serviced or inspected. A small number of bottom outlet openings can be inspected by removing the inducer assembly. See Flushing Collector Box and Drainage System section for details on removing inducer assembly.

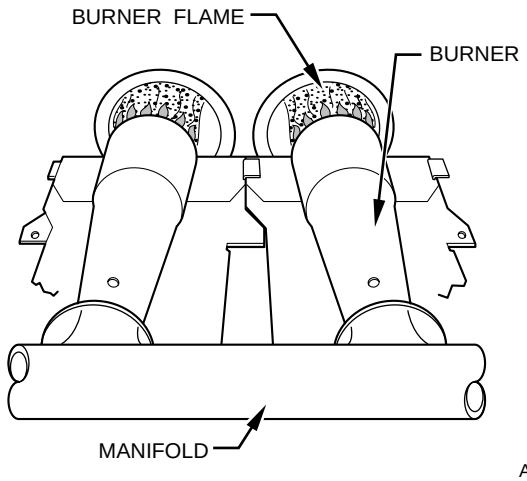

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Fig. 9—Burner Flame

Step 5—Flushing Collector Box and Drainage System

1. Turn off gas and electrical supplies to furnace.
2. Remove main furnace door.
3. Disconnect inducer motor and pressure switch wires or connectors.
4. Disconnect pressure switch tubes.
5. Disconnect vent pipe from inducer housing outlet by loosening coupling clamp on inducer outlet.
6. Disconnect drain tube from inducer housing. (See Fig. 8.)
7. Remove inducer housing assembly by removing 4 bolts attaching assembly to cell panel.
8. Flush inside of collector box with water until discharge from condensate trap is clean and runs freely.

NOTE: Ensure the drain tube disconnected from the inducer housing is higher than the collector box opening or water will flow out tube.

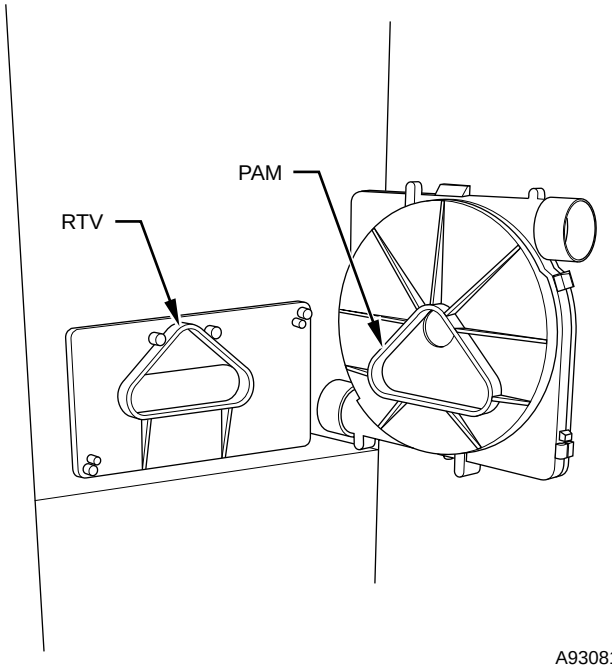

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Fig. 10—Gasket on Collector Box

9. Inspect inside area of collector box for any pieces of foreign materials and remove if present.

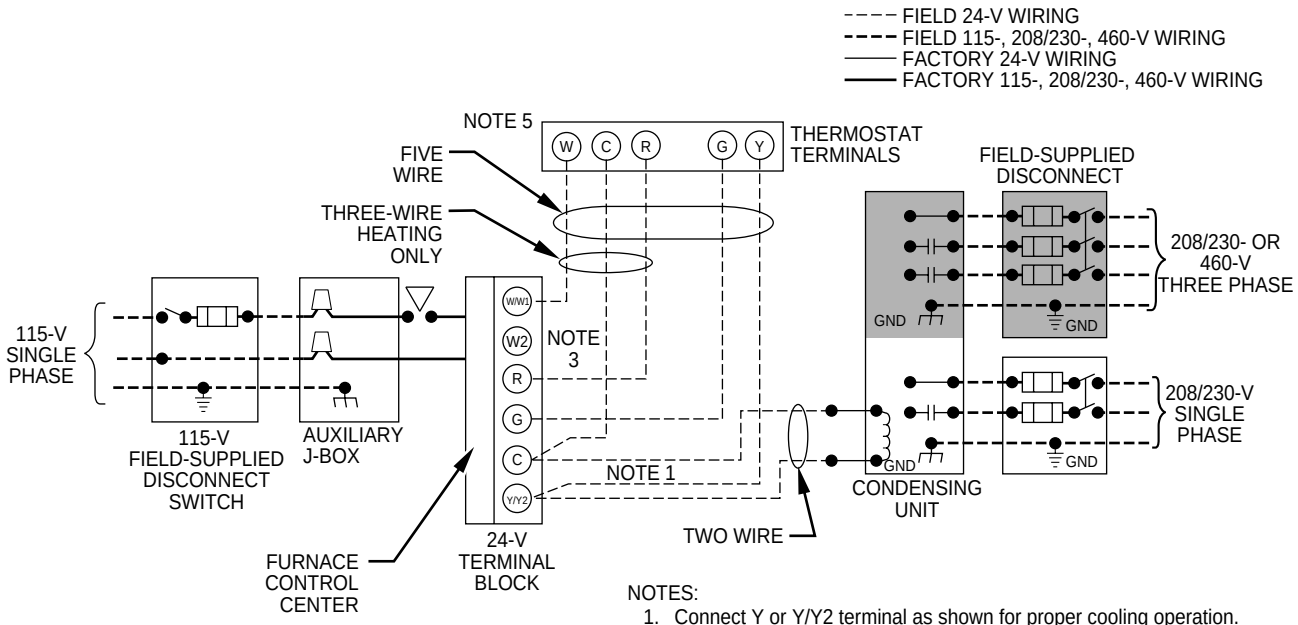
⚠ CAUTION

DO NOT use wire brush or other sharp object to inspect or dislodge materials in secondary heat exchangers as failure of the secondary heat exchanger will occur. Flush with water only.

10. Reassemble inducer assembly by reversing items 5-7. Tighten vent coupling clamp screw(s) to 15 in.-lb of torque.

NOTE: If seal between the inducer housing and the collector box is damaged in any way, it must be repaired. To repair, apply sealant releasing agent such as PAM cooking spray or equivalent (must not contain corn or canola oil, aromatic or halogenated hydrocarbons or inadequate seal may occur) to inducer housing. (See Fig. 10.) Apply a small bead of G.E. RTV 162, G.E. RTV 6702, or Dow-Corning RTV 738 sealant to groove in collector box.

11. Refer to furnace wiring diagram and reconnect wires to inducer motor and pressure switches or connectors.
12. Reconnect pressure tubes to pressure switches. See diagram on main furnace door for proper location of tubes. Be sure tubes are not kinked. (See Fig. 8.)
13. Turn on gas and electrical supplies to furnace.
14. Check furnace operation through 2 complete heat operating cycles. Check area below inducer housing, vent pipe, and condensate trap to ensure no condensate leaks occur. If leaks are found, correct the problem.
15. Check for gas leaks.



NOTES:
1. Connect Y or Y/Y2 terminal as shown for proper cooling operation.
2. Proper polarity must be maintained for 115-v wiring.
3. Use W2 with 2-stage thermostat when zoning.
4. If any of the original wire, as supplied, must be replaced, use same type or equivalent wire.
5. Some thermostats require a "C" terminal connection as shown.

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Fig. 11—Field Wiring

⚠ WARNING

Never use matches, candles, flame, or other sources of ignition to check for gas leakage. Use a soap-and-water solution. Failure to follow this warning could result in a fire, personal injury, or death.

16. Replace main furnace door.

Step 6—Servicing Hot Surface Ignitor

The ignitor does NOT require annual inspection. Check ignitor resistance before removal.

1. Turn off gas and electrical supplies to furnace.
2. Remove main furnace door.
3. Disconnect ignitor wire connection.
4. Check ignitor resistance.
   a. Using an ohm meter, check resistance across both ignitor leads in connector.
   b. Cold reading should be between 45 ohms and 90 ohms.
   c. If ohm reading is higher than 110 ohms, ignitor is cracked and must be replaced.
5. Remove ignitor assembly.

⚠ CAUTION

Allow ignitor to cool before removal. Normal operation temperatures exceed 2000°.

   a. Do not remove ignitor from bracket while assembly is in furnace. Using a 1/4 in. nutdriver, remove screw securing bracket and ignitor assembly to bottom of burner box. The screw in the bracket is always located toward outside of burner box. The screw may be hidden by inlet box or inlet pipe, but can be removed without removing either. After removing screw, slide ignitor and bracket toward outside of burner box and pull straight out.

⚠ CAUTION

The ignitor is fragile. DO NOT allow it to hit the side of the burner box opening while removing or replacing it.

   b. Inspect ignitor for a white area indicating a crack may be present. If found, replace ignitor.

NOTE: A small crack cannot be seen on a new ignitor. After a period of operation, a white area will be visible around the crack.

   c. If replacement is required, replace ignitor on ignitor bracket external to furnace to avoid damage as the silicon portion is very brittle and will easily crack or shatter.
   d. To remove ignitor from ignitor bracket, remove screw holding ignitor ceramic block to bracket and pull ceramic block out of bracket.
6. To replace ignitor/ignitor assembly, reverse items 5a through 5d.
7. Reconnect ignitor wire connection.
8. Turn on gas and electrical supplies to furnace.
9. Verify ignitor operation by initiating control board self-test feature or by cycling thermostat.
10. Replace main furnace door.

Step 7—Electrical Controls and Wiring

⚠ CAUTION

There may be more than 1 electrical supply to the unit. Check accessories and cooling unit for additional electrical supplies.

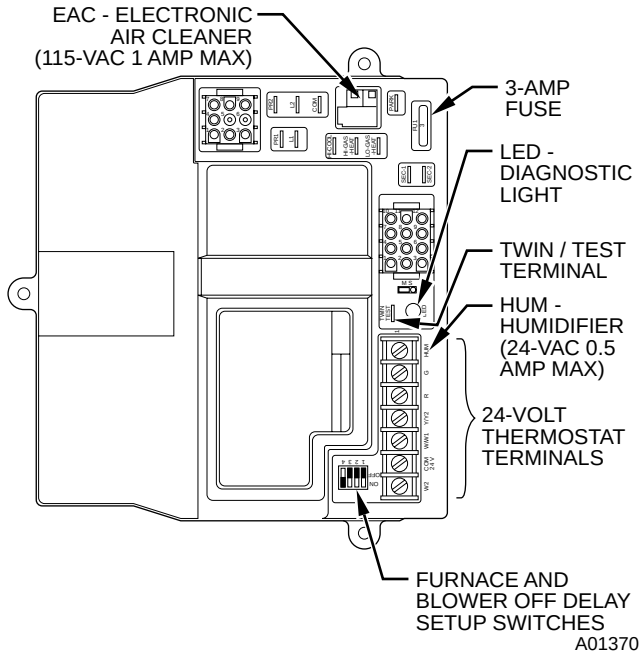
The electrical ground and polarity for 115-v wiring must be maintained properly. Refer to Fig. 11 for field wiring information and to Fig. 16 for unit wiring information.

NOTE: If the polarity is not correct, the STATUS LED on the control will flash rapidly and prevent the furnace from operating. The control system also requires an earth ground for proper operation of the control and flame sensing.

The 24-v circuit contains an automotive-type, 3-amp fuse located on the control center. (See Fig. 12.) Any direct shorts of the 24-v wiring during installation, service, or maintenance will cause this fuse to blow. If fuse replacement is required, use ONLY a 3 amp fuse. The control LED will display status code 24 when fuse needs to be replaced.

With power to the unit disconnected, check all electrical connections for tightness. Tighten all screws on electrical connections. If any smoky or burned connections are found, disassemble the connection, clean all parts, strip wire, and reassemble properly and securely.

Reconnect electrical supply to unit and observe unit through 1 complete operating cycle. Electrical controls are difficult to check without proper instrumentation; if there are any discrepancies in the operating cycle, contact your dealer and request service.



→ **Fig. 12—Two-Stage Control**

Step 8—Checking Heat Tape Operation (If Applicable)

In applications where the ambient temperature around the furnace is 32°F or lower, freeze protection measures are required. If this application is where heat tape has been applied, check to ensure it will operate when low temperatures are present.

NOTE: Heat tape, when used, should be wrapped around the condensate drain trap and drain line. There is no need to use heat tape within the furnace casing. Most heat tapes are temperature activated, and it is not practical to verify the actual heating of the tape. Check the following:

1. Check for signs of physical damage to heat tape such as nicks, cuts, abrasions, gnawing by animals, etc.

⚠ CAUTION

If this furnace is installed in an unconditioned space where the ambient temperatures may be 32°F or lower, freeze protection measures must be taken. (See Fig. 13.)

2. Check for discolored heat tape insulation. If any damage or discolored insulation is evident, replace heat tape.
3. Check that heat tape power supply circuit is on.

Step 9—Winterizing

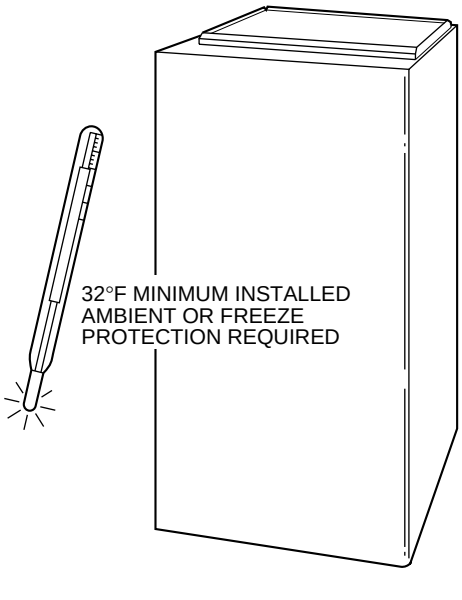


Fig. 13—Winterizing the Furnace

⚠ CAUTION

Freezing condensate left in the furnace will damage the equipment.

If the furnace will be off for an extended period of time in a structure where the temperature will drop to 32°F or below, winterize as follows:

1. Turn off electrical supply to furnace.
2. Remove main furnace door.
3. Disconnect cap from unused drain tap on inducer housing. (See Fig. 14.)
4. Insert funnel in drain tube and pour antifreeze, propylene glycol (RV, swimming pool antifreeze, or equivalent) into furnace until it is visible at point where condensate enters open drain. (See Fig. 15.)
5. Reconnect drain tube to inducer housing.
6. Replace main furnace door.

⚠ CAUTION

Do not use ethylene glycol (Prestone II antifreeze/coolant or equivalent automotive type). Failure of plastic components will occur.

WIRING DIAGRAM

See Fig. 16 for Wiring Diagram.

TROUBLESHOOTING

Use the Troubleshooting Guide, the status code LED on the control and the Component Test to isolate furnace operation problems.

Step 1—Status Codes

For an explanation of status codes, refer to service label located on back of main furnace door or Fig. 17. The control will store up to 5 previous codes but will not store a non-current code longer than 48 hr.

NOTE: Removing the blower access door will open the blower access door switch and terminate 115-v power to the control is interrupted.

To read current status code, remove main furnace door. The status code LED can be viewed through the sight glass on the blower access door.

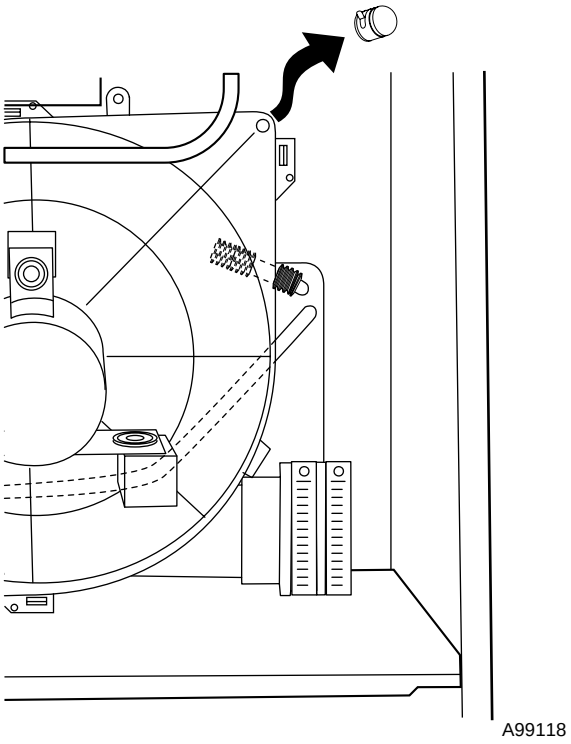


Fig. 14—Inducer Housing Drain Tube

NOTE: NO thermostat signals may be present at control and all blower off delays must be expired to view previous codes.

To retrieve previous codes, remove 1 of the red main limit wires 1 to 4 sec until the LED light goes out, then reconnect it. (Do not leave red wire disconnected for longer periods of time as the control will assume an overtemperature condition exits and will respond with blower operation.) This places the control in the status recall mode and displays the first code stored in memory.

Record the code and repeat the disconnect and reconnect of the red wire, recording each code until code 11 is displayed indicating no additional faults. After the last code is displayed or after 2 minutes in the code, recall mode the control will return to normal standby mode.

Step 2—Component Test

Use the Component Test to check furnace components for proper operation. To initiate the component self-test sequence, shut off the room thermostat or disconnect the "R"thermostat lead. Briefly (approximately 2 sec) short the TWIN/TEST terminal to the COM 24V terminal. The status LED will turn off. The test sequence will be as follows:

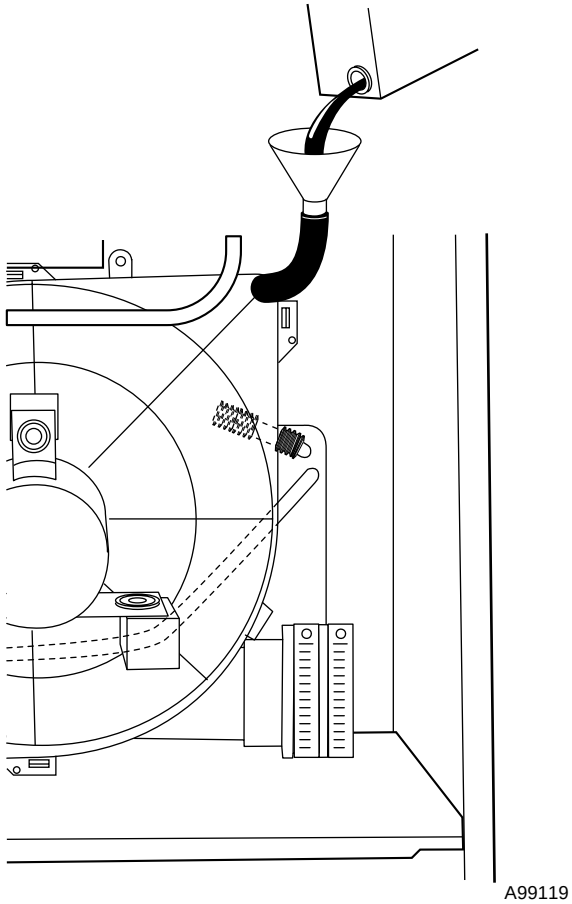
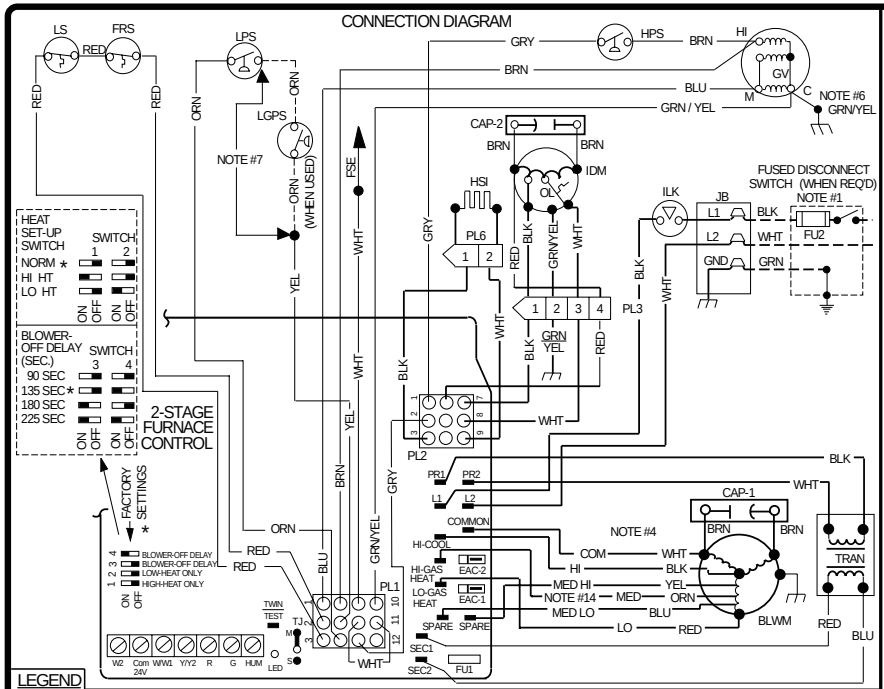
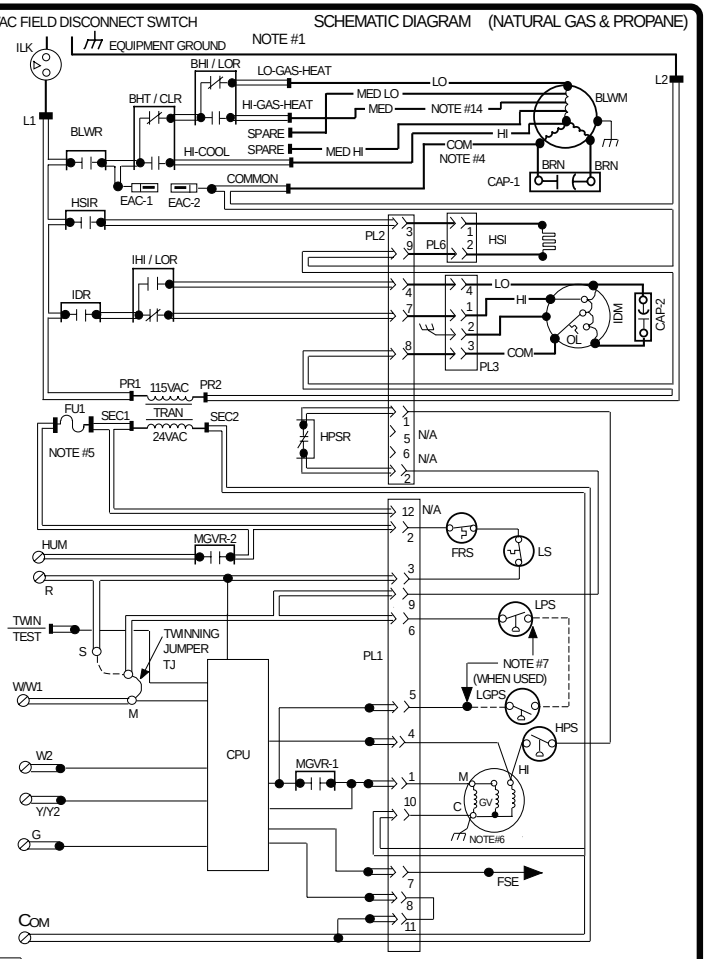


Fig. 15—Funnel in Drain and Antifreeze Running Through Trap

1. The inducer will start and run on high speed.
2. After 7 sec the inducer motor will continue to run while the hot surface ignitor HSI is energized for 15 sec, then de-energized.
3. The inducer motor changes to low speed and continues to run the remainder of the component self-test.
4. The blower motor operates on LO GAS-HEAT speed for 7 sec.
5. The blower motor operates on HI GAS-HEAT speed for 7 sec.
6. The blower motor operates on HI COOL speed for 7 sec.
7. The gas valve and humidifier terminal HUM are not energized for safety reasons.





LEGEND

BHI / LOR	BLOWER MOTOR SPEED CHANGE RELAY, SPDT
BHT / CLR	BLOWER MOTOR SPEED CHANGE RELAY, SPDT
BLWM	BLOWER MOTOR, 4 or 5 -SPEED, PERMANENT-SPLIT-CAPACITOR
BLWR	BLOWER MOTOR RELAY, SPST (N.O.)
CAP	CAPACITOR -1 = BLWM -2 = IDM
CPU	MICROPROCESSOR AND CIRCUITRY
EAC-1	ELECTRONIC AIR CLEANER CONNECTION (115 VAC, 1 AMP MAX.)
EAC-2	ELECTRONIC AIR CLEANER CONNECTION (COMMON)
FRS	FLAME ROLLOUT SWITCH OVERTEMP. MANUAL RESET, SPST (N.C.)
FSE	FLAME-PROVING SENSOR ELECTRODE
FU1	FUSE, 3 AMP, AUTOMOTIVE BLADE TYPE, FACTORY INSTALLED
FU2	FUSE, FIELD INSTALLED
GV	GAS VALVE, REDUNDANT LOW-HEAT OPERATORS, 2-STAGE
HPS	HIGH-HEAT PRESSURE SWITCH, SPST (N.O.)
HPSR	HIGH-HEAT PRESSURE SWITCH RELAY, SPST (N.C.)
HSI	HOT-SURFACE IGNITER (115 VAC)
HSIR	HOT-SURFACE IGNITOR RELAY, SPST (N.O.)
HUM	24VAC HUMIDIFIER CONNECTION (0.5 AMP. MAX.)
IDM	INDUCED DRAFT MOTOR, 2-SPEED, SHADED-POLE
IDR	INDUCER MOTOR RELAY, SPST (N.O.)
IHI / LOR	INDUCER MOTOR SPEED CHANGE RELAY, SPDT
ILK	BLOWER DOOR INTERLOCK SWITCH, SPST (N.O.)
JB	JUNCTION BOX
LED	LIGHT-EMITTING DIODE FOR STATUS CODES
LGPS	LOW GAS-PRESSURE SWITCH, SPST (N.O.)
LPS	LOW-HEAT PRESSURE SWITCH, SPST (N.O.)
LS	LIMIT SWITCH, OVERTEMPERATURE-AUTO RESET, SPST (N.C.)
MGVR	MAIN GAS VALVE RELAY, DPST (N.O.) -1 = VALVE -2 = HUMIDIFIER
PL1	12-CIRCUIT CONNECTOR
PL2	9-CIRCUIT CONNECTOR
PL3	4-CIRCUIT IDM CONNECTOR
PL6	2-CIRCUIT HSI CONNECTOR
SW1	HIGH-HEAT-ONLY SWITCH, SPST (MANUAL)*
SW2	LOW-HEAT-ONLY SWITCH, SPST (MANUAL)*
SW3 & 4	BLOWER-OFF DELAY SETTING SWITCHES, SPST (MANUAL)*
TJ	TWINNING JUMPER, SPDT FOR MAIN OR SECONDARY STATUS (MANUAL CHANGE OVER)
TRAN	TRANSFORMER-115VAC/24VAC
TWIN/TEST	1-CIRCUIT TWINNING BUSS CONNECTOR, ALSO COMPONENT TEST
	JUNCTION
	TERMINAL
	CONTROL TERMINAL
	FACTORY POWER WIRING (115VAC)
	FACTORY CONTROL WIRING (24VAC)
	FIELD POWER WIRING (115VAC)
	FIELD CONTROL WIRING (24VAC)
	CONDUCTOR ON CONTROL
	FIELD WIRING SCREW TERMINAL
	FIELD GROUND
	EQUIPMENT GROUND
	FIELD SPLICE
	PLUG RECEPTACLE

NOTES:

1. Use only copper wire between the disconnect switch and the unit.
2. If any of the original wire, as supplied, must be replaced, use the same or equivalent type wire.
3. Inducer (IDM) and blower (BLWM) motors contain internal auto-reset thermal overload switches.
4. Blower motor speed selections are for average conditions. See Installation Instructions for details on optimum speed selection.
5. Replace only with a 3-AMP fuse.
6. This wire must be connected to furnace sheet metal for control to prove flame.
7. Factory connected when LGPS not used.
8. Symbols are an electrical representation only.
9. BLOWER-ON DELAY: Gas heating 60 seconds, Cooling/Heat Pump 2 seconds.
10. BLOWER-OFF DELAY: Gas heating 90, 135, 180, or 225 seconds, cooling or heat pump 90 seconds.
11. IGNITION-LOCKOUT will occur after four consecutive unsuccessful trials-for-ignition. Control will automatically reset after three hours.
12. Control must be grounded at pin 10 of 12-pin connector.
13. NA - Not Applicable (Not used)
14. Orange lead not available on all models.

COMPONENT TEST

To initiate the component test sequence with no thermostat inputs and with all inducer Post-Purge and Blower-Off Delay periods completed, short the "TWIN/TEST" terminal to the "COM" terminal for about two seconds. The control will turn ON the inducer motor High-Speed, HSI, inducer motor Low-Speed, blower motor Low-Gas-Heat Speed, blower motor High-Gas-Heat Speed, and blower motor High-Cool Speed for 7-15 seconds each (the inducer motor will be ON the entire length of the test). Neither the gas valve nor the humidifier will be turned ON.

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→ **Fig. 16—Wiring Diagram**

SERVICE

If status code recall is needed, do not remove power or blower door. Briefly remove and then reconnect one main limit wire to display stored status code.

LED CODE STATUS

CONTINUOUS OFF - Check for 115VAC at L1 and L2, and 24VAC at SEC1 and SEC2 .
CONTINUOUS ON - Control has 24VAC power.
RAPID FLASHING - Line voltage (115VAC) polarity reversed. If twinned, refer to twinning kit instructions.

Each of the following status codes is a two-digit number with the first digit determined by the number of short flashes and the second digit by the number of long flashes.

11 **NO PREVIOUS CODE** - Stored status codes are erased when power (115VAC or 24VAC) to control is interrupted or 48 hours after each fault is cleared.

12 **BLOWER ON AFTER POWER UP (115VAC or 24VAC)** - Blower runs for 90 seconds, if unit is powered up during a call for heat (R-W closed).

13 **LIMIT OR FLAME ROLL-OUT SWITCH LOCKOUT** - Control will auto reset after three hours. Reset switch or replace fuse link. Refer to #33.

14 **IGNITION LOCKOUT -** Control will auto-reset after three hours. Refer to #34.

21 **GAS HEATING LOCKOUT -** Control will NOT auto-reset.
Check for: - Mis-wired gas valve - Defective control (valve relay)

22 **ABNORMAL FLAME-PROVING SIGNAL** - Flame is proved while gas valve is de-energized. Inducer will run until fault is cleared. Check for:
- Leaky gas valve - Stuck-open gas valve

23 **PRESSURE SWITCH DID NOT OPEN** Check for:
- Obstructed pressure tubing - Pressure switch stuck closed.

24 **SECONDARY VOLTAGE FUSE IS OPEN** Check for: - Short-circuit in secondary voltage (24VAC) wiring

31 **HIGH-HEAT PRESSURE SWITCH OR RELAY DID NOT CLOSE OR REOPENED**
Check for: -Control relay may be defective - Refer to #32

32 **LOW-HEAT PRESSURE, DRAFT SAFEGUARD** (when used)**, OR AUX-LIMIT** (when used*) **SWITCH DID NOT CLOSE OR REOPENED (DOWNFLOW ONLY*)** If open longer than five minutes, inducer shuts off for 15 minutes before retry. If it opens after trial for ignition period, blower will come on for 90 second recycle delay. Check for:
*- Defective blower motor or capacitor - Restricted vent
- Proper vent sizing - Low inducer voltage (115VAC)
- Disconnected or obstructed pressure tubing - Excessive wind
- Defective inducer motor - Defective pressure switch
- Inadequate combustion air supply - Low propane inlet gas pressure

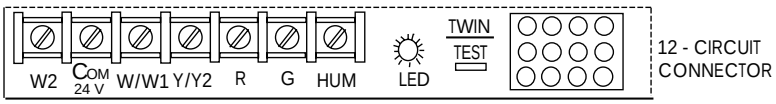
33 **LIMIT OR FLAME ROLL-OUT SWITCH IS OPEN** - If open longer than three minutes, code changes to #13. Flame roll-out switch requires manual reset. Check for:
- Dirty filter or restricted duct system. - Loose blower wheel.
- Defective blower motor or capacitor. - Defective switch or connections.
- Inadequate combustion air supply (Flame roll-out switch or fuse link open).
- Open flame roll-out switch, or fuse link. Manual reset or replace.

34 **IGNITION PROVING FAILURE** - Control will try three more times before lockout #14 occurs. If flamesignal is lost after trial for ignition period, blower will come on for 90 second recycle delay. Check for:
- Gas valve defective or gas valve turned off.
- Oxide buildup on flame sensor (clean with fine steel wool).
- Proper flame sense current (.5 microamps D.C. min., 4.0 - 6.0 nom. in HIGH HEAT).
- Green wire **MUST** be connected to furnace sheet metal.
- Flame sensor must be ungrounded. - Manual valve shut-off.
- Defective hot surface ignitor - Control ground continuity.
- Inadequate flame carryover or rough ignition. - Low inlet gas pressure.

43 **LOW-HEAT PRESSURE, DRAFT SAFEGUARD** (when used)**, OR AUX-LIMIT** (when used*) **SWITCH OPEN WHILE HIGH-HEAT PRESSURE SWITCH IS CLOSED** Check for:
- Pressure switch stuck open - Disconnected or obstructed pressure tubing
- Refer to #32 and #33 - Low propane inlet gas pressure

45 **REPLACE CONTROL**

COMPONENT TEST



To initiate the component self-test sequence, shut off the room thermostat or disconnect the "R" thermostat lead. Briefly short the TWIN/TEST terminal to the Com24V terminal. Status LED will turn off. NON-CONDENSING FURNACE: The control will turn ON the inducer motor low speed, then high speed and remain on high speed for the entire test. The other components will be ON for 7 to 15 seconds: Hot surface ignitor, Low heat blower speed, High heat blower speed, High cooling blower speed. CONDENSING FURNACE: The inducer motor will start in high speed and remain on high speed until the end of the test, then shift to low speed for 7 to 15 seconds. All other components will be tested in the same sequence as the NON-CONDENSING.

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→ **Fig. 17—Service Label**

TROUBLESHOOTING GUIDE

NOTES:

1. Refer to information label on blower compartment door for procedure for use of LED status codes and problem solving suggestions.
2. LED indicator is viewed through window on blower compartment door.
3. If 115-vac power is energized or interrupted during a call for heat, the indoor blower will run for 90 sec before a gas heating cycle begins – **Code 12**.
4. After replacing any component, verify correct operating sequence.

⚠ WARNING

ELECTRICAL SHOCK HAZARD

ONLY QUALIFIED AND TRAINED SERVICE PERSONNEL SHOULD PERFORM THIS PROCEDURE

START

Turn thermostat **OFF**.

On furnace control, note current settings for setup switches 1 (SW-1) and 2 (SW-2) then set SW-1 to **OFF** and SW-2 to **ON**.

Cycle 115-v power off for 3 sec, then on.

Continuous LED? — No

- If LED is flashing rapidly, check line voltage polarity.
- If **Code 24** is displayed, check for blown fuse.
- If LED is **OFF**, check line voltage and 24-v transformer.
- If **Code 45** is displayed, replace control.

Yes

Set thermostat to call for heat. Set **FAN** switch to **AUTO**.

Draft inducer motor starts. — No

Is indoor blower on ? — Yes

- 24v should be present across R and C. If not, check for:
  1. Open flame rollout switch (FRS) – **Code 33**.
  2. Open limit switch (LS) – **Code 33.**
  3. Check all low-voltage wiring connections.

No

- 24v should be present across C and W. If not, check for:
  1. Open thermostat.
  2. Open 24-v fuse (FU1) – **Code 24.**
  3. Failed transformer.
- If **Code 23** is displayed, the pressure switch(es) is stuck closed. Replace switch and/or check pressure tube for blockage.
- System malfunction – **Code 21.**

No — Replace control only if all checks are OK.

- 115v should be present at the inducer motor. If so, replace inducer motor. If not, check 115-v wiring.

Yes

Is **Code 22** displayed? — No

- If **Code 32** is displayed check for:
  1. Open gas inlet pressure switch (when used).
  2. Open pressure switch (LPS) and/or tube – **Code 32.**
  3. Open Propane low gas pressure switch (LGPS) – **Code 32.**
  4. Check all low-voltage wiring connections.

115v should be present at the ignitor. If so, replace the ignitor; if not,
- check 115-vac wiring to ignitor.

LPS or LGPS open while HPS is closed (high-gas-heat only) –
- **Code 43.**

No — Replace control only if **Code 45** is displayed, or if all checks are OK.

Yes

Flame present when not normal. Replace gas valve.

15-sec inducer pre-purge.

Yes

Ignitor warms up and glows orange/yellow; 17-sec warm-up. — No

Control will attempt to light burners 4 times (approximately 1 minute between attempts – **Code 34**). Voltage is present at the gas valve for 7 sec during each ignition trial. System will lockout after 4 attempts.

- Is the gas valve control knob in the **OPEN** or **ON** position?
- 24v should be present across the gas valve terminals **C** and **M** (and **C** and **HI** for high-fire test) during the 7 sec ignition trial. If not, check all low-voltage wiring connections to valve.
- If 24v are present, and main gas does not flow:
  1. Supply pressure > 13.6-in. wc.
  2. Replace gas valve.
- Check ignitor position.
- Check burner carryover gap.

No — Replace control only if **Code 45** is displayed, or if all checks are OK.

Yes

Main burners ignite. — No

- Check gas supply pressure (4.5-in. wc minimum).
- Check manifold pressure (1.3- to 1.7-in. wc for low-fire; 3.2- to 3.8-in. wc for high fire).
- Check for proper orifice size.

Yes

Main burners stay on. — No

Is **Code 31** (high-gas-heat only), **32, 33, or 34** displayed? Check code information label to diagnose.

- Check polarity of 115-v power at J-box and control. Twinned furnace polarities must match – rapid flashing **LED**.
- Check ground continutity from J-box to control.
- Check flame sensor microamps (4.0 nominal; 0.5 minimum for control to recognize flame).

No — Replace control if **Code 45** is displayed, or if all checks are OK. Clean flame sensor if microamps are below nominal.

Yes

Indoor blower motor starts on heating speed after 60-sec warm-up period. — No

- 115v should be present at the blower motor. If so, check capacitor. If capacitor is OK, replace blower motor. If 115v are not present at the blower motor, check all 115-v wiring to motor.

No — Replace control only if **Code 45** is displayed, or if all checks are OK.

Yes

Furnace runs until call for heat ends. — No

- If not, check for:
  1. Satisfied thermostat.
  2. Open inlet gas pressure switch (when used).
  3. Open propane low gas pressure switch (LGPS) – **Code 32**.
  4. Open auxilliary limit (ALS)(downflow/horizontal only) – **Code 32**.
  5. Open 24-v fuse (FU1) – **Code 24**.
  6. Open limit switch (LS) – **Code 13** or **33**.
  7. Open flame rollout switch (FRS) – **Code 13** or **33**.
  8. Check 115-v line voltage – **LED** off.

Check for sources of electrical noise interference (electronic air cleaners, nearby TV, or radio antennas).

No — Replace control only if **Code 45** is displayed, or if all checks are OK.

Yes

Turn thermostat to **OFF**; gas valve shuts off burners; 15-sec inducer post purge. — No

- If inducer and burners continue to operate, check for 24v at the gas valve. If 24v are present, verify that the thermostat is open across R and W. If no voltage is present, turn the gas valve control knob to the **OFF** position. Replace gas valve.

No — Replace control only if **Code 45** is displayed, or if all checks are OK.

Yes

Indoor blower motor stops after 90, 135, 180, or 225 sec. — No

- 24v should be present across R and C. If not, check for:
  1. Open limit switch (LS) – **Code 13 or 33**.
  2. Open flame rollout switch (FRS) – **Code 13 or 33**.
- 24v should not be present across R and G. If so, turn thermostat **FAN** switch to **AUTO**.

No — Replace control only if **Code 45** is displayed, or if all checks are OK.

Yes

Heating sequence of operation complete. Remove blower door, move setup switch 1 (SW-1) to **ON** position and repeat process to check high-fire operation. (When finished return SW-1 and SW-2 to original desired settings.)

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